DOCUMENT RESUME

ED 099 821 CS 001 542

AUTHOR Schnell, Thomas R.; Rocchio, Daniel J.
TITLE A Study of the Relative Effectiveness of Various Underlining Strategies on Reading Comprehension.
PUB DATE Nov 74
NOTE 18p.; Paper presented at the Annual Meeting of the College Reading Association (18th, Bethesda, Maryland, October 31-November 2, 1974)

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS *Cues; Reading; Reading Ability; Reading Achievement; *Reading Comprehension; *Reading Improvement; *Reading Research; *Recall (Psychological); Secondary Education
IDENTIFIERS *Underlining

ABSTRACT

Research on the use of underlining or typographical cueing to improve both immediate and delayed recall of prose material by high school students is described and analyzed. Student underlining (with and without prior underlining instruction) instructor underlining, and noncued reading of a study-type material were examined, along with interactions between criterion test reading scores and the prior reading ability of students in the study. Data indicated that underlining, whether performed by the student or by the instructor before the students' reading, resulted in increased immediate and delayed recall. Also, a significant interaction did exist between criterion test scores and prior reading ability on delayed recall, but not on immediate recall. (Author)

ED 099021

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Thomas R. Schnell
University of Missouri-St. Louis

Daniel J. Rocchio
Affton School District

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY
Thomas R. Schnell
Daniel J. Rocchio
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER

A Study of the Relative Effectiveness of Various Underlining Strategies on Reading Comprehension

There are indications that many secondary school teachers, both reading specialists and content teachers, instruct students in the use of specific study techniques (such as SQ3R) aimed at improving reading comprehension and retention. There are further indications that many students use their own study techniques intuitively, sometimes less successfully than they might desire. Because of these indications, a need for research in the area of planned study approaches has been felt by people in various disciplines, and has been done in areas that include such ideas as organizers, mathemagenic activities, PQRST and others. This particular study has been done to determine the relative effectiveness of underlining as a study and retention technique, based on the theory that the isolation or cueing of selected

CS 001 543

parts of a reading selection will facilitate comprehension and recall more than reading alone will.

Review of Related Literature

Investigations in underlining, set in instructional situations and involving reading and some measure of comprehension or recall, can be divided into three categories, based on procedural differences. One area of research in which students or examinees with no prior instruction underlined what they thought to be important and wished to recall later, is described and analyzed below.

Matthews (1938) in a study with high school students, grades 9-12, asked if the underlining of important concepts and ideas by the student is more effective than outline notes or reading without notes. He reported no significant differences on two comprehension measures between the treatment groups which 1) read and did no writing, 2) underlined while reading, and 3) took notes on a separate sheet of paper while reading. One measure of comprehension required factual recall and the other asked students to complete an outline of the passage.

Arnold (1942) with college students and Stordahl and Christensen (1956) with Air Force trainees found no significant differences on immediate and delayed recall between treatment groups who used the techniques of 1) repetitive reading, 2) underlining and marginal notes, 3) outlining, or 4) precis writing.

Idstein and Jenkins (1972) carried out two investigations comparing student underlining and repetitive reading along with the effect of varied review schedules. One study using a 1200 word passage and allowing 29 minutes of study and 4½ minutes of review was evaluated by a 24 item completion test. The second study using a 6000 word passage and allowing 50

minutes of study and 15 minutes of review was evaluated by a 31 item completion test. Neither study produced significant differences among treatment groups.

Studies comparing underlining performed by students with no prior instruction, and other forms of study skills and repetitive reading have consistently failed to show the effectiveness of underlining.

In the second type of underlining research the investigator underlined or isolated parts of the passage for the examinee.

Klare, Mabry, and Gustafson (1955) using a group of 989 Air Force trainees, analyzed the following three presentations of a 1200 word passage from an aircraft mechanics manual: 1) 199 words which were to appear in the correct answers of the 50 item multiple choice retention test were underlined; 2) 129 important words which carried essential information were underlined without regard to correct choices on the test; 3) the standard unpatterned passage. Results showed that the underlining of selected words of a reading passage, even though subjects were given no indication of its rationale, may result in greater immediate retention (not significant at .05 level) than non-cued material and that subjects with higher aptitudes and underlining received significantly higher (at .05 level) test scores than similar subjects who did not receive the underlined passages.

Cashen and Leicht (1970) using 40 college freshmen devised 15 multiple-choice questions based on 15 statements underlined in red and 15 questions based on adjacent statements in order to examine whether underlining facilitates comprehension; and, if so, what effect this learning has on adjacent non-isolated items. The group which received the underlined passage scored significantly higher than the control group which received only the reading

passage on both measures of comprehension. Therefore underlining did facilitate comprehension, but better performance on questions cued by underlining statements did not appear to occur at the expense of non-cued information.

Crouse and Idstein (1972) conducted two experiments in underlining. The first compared a control group which studied and was told to learn as much as possible with three groups which received varying directions and which received underlined parts in the passage that answered all the comprehension questions. Each subject studied three 212 word passages and although mean performances for the cued groups were greater, the differences were not significant at a .05 level.

The second study used only one 6000 word passage with a 30 question criterion test. One group read as if studying for a test, but group two was told that the underlined material contained answers to questions asked later. All parts of the passage which identified information contained by the output question and which identified information needed to answer the questions were underlined. Data indicated significantly greater scores in comprehension for the underlined group and that this difference was much greater for fast and medium-learning subjects than slow-learning subjects.

This second category of underlining research indicated that prior instructor underlining of prose passages from various content fields can facilitate immediate comprehension, especially for students of higher aptitudes and reading ability. Evidence on whether or not questions from the criterion test must be derived from the cued sections is conflicting and, at present, inconclusive.

The third area of research compared student underlining after instruction with other reading and study techniques.

Willmore (1966) used 80 college students enrolled in a how-to-study class to compare reading, underlining, outlining, and SQ3R as methods of studying a history text. After a 50 minute lecture on each technqiue, four chapters of the text were studied using the various techniques. Underlining scores on the immediate and delayed criterion tests were significantly greater than reading, outlining, and SQ3R scores, when adjustments were made for time.

Statement of the Problem

The purposes of this study were 1) to determine if underlining improved the comprehension and delayed recall of textbook-type material; and if so 2) to determine whether instructor underlining, student underlining, or student underlining with instruction significantly affected criterion test scores; 3) to determine whether prior reading ability may affect the value of this study technique for certain students; and 4) to examine the implications and limitations of these procedures in developing educational objectives, techniques and materials, and in performing further research.

Clarification of Terms

1. Comprehension: Since there is much debate as to what constitutes comprehension, an operational definition based on the "literal" and "interpretive" levels described in Herber, Early, and Sheldon (1967) will be used. Remembering or recognizing, in its original or nearly original form, any part or whole of the printed material is the literal level of comprehension. The second level requires one to examine terms and ideas acquired on the literal level, thus requiring higher-level though processes such as translating abstract ideas into concrete examples, drawing inferences, seeing relationships and associations, making comparisons and generalizations, and

evaluating the reliability and/or value of the material. Questions on the third (application) level of comprehension were not included. A 20 item multiple-choice test of both literal and interpretive questions was given to determine comprehension. According to the guidelines above, twelve of twenty comprehension questions were on the literal level and eight were on the interpretive level.

2. Prior Reading Ability: This term is used to describe the students' scores (in standard score units) on the comprehension subtest of the Gates-MacGinitie Reading Test, Survey F, Form 1M (1969), a standardized reading test which was administered prior to carrying out this research.

3. Immediate Recall: The students' performance on the multiple-choice criterion test administered immediately following their completion of the reading passage.

4. Delayed Recall: The students' performance on the second administration of the multiple-choice comprehension test, eleven days after the initial testing. Students did not reread or review the article before the delayed recall test.

5. Instructor Underlined Sections: The underlining was performed by the investigator without regard to the multiple-choice questions or answers, but according to the following guidelines explained and developed in Read, Underline, Review (1970): 1) underline the right amount by selecting a few words immediately and a few later on which when read for review made smooth, flowing sense and state the main ideas of the passage; 2) never underline complete sentences; 3) underline completely by reading through an entire paragraph or section, first deciding how many major ideas are presented; then after a full reading, plan the underlining to indicate all the ideas

presented; 4) underline correctly by rereading just the underlined words to see that you get the same information regardless of whether you review by reading the whole page or just the underlining.

Approximately 201 words of the 1043 word passage (19%) were isolated by underlining with a red felt tip pen. This percentage remained fairly constant throughout each paragraph in the passage. Answers (either direct or indirect) to twelve of the twenty questions were underlined in the passage.

Research Hypotheses

Fourteen research hypotheses were treated statistically in this experiment, based on the following questions:

Among high school students, does underlining result in better immediate and delayed comprehension than reading without underlining, does the method of presenting the underlining affect the comprehension scores, and does prior reading ability interact with criterion test scores on immediate and delayed recall?

Procedure

The four treatment groups for this study were composed of 88 students (grades 10-12) enrolled at Hazelwood Senior High School in St. Louis, Missouri. The population can be described as predominantly white, middle class and urban.

Each treatment group was enrolled in a separate section of an elective course for improving reading comprehension, rate, and study skills. Students were not screened for enrollment, but only students of average and above average reading ability were encouraged to take the course. All treatment groups were found to be equal in reading ability based on class average

standard scores on the comprehension subtest of the Gates-MacGinitie Reading Test, Survey F, Form 1M. The class average for three of the groups was identical while the remaining group's average differed by only two standard score units. Therefore no attempt at randomization within each class was necessary. (Results of average group scores and number of students in each grade within groups are reported in Table 1.)

TABLE 1 ABOUT HERE

Group one received instruction and practice in underlining for two 55 minute sessions prior to the experiment. Instruction was based on the same guidelines for underlining explained previously from Read, Underline, Review: A Method for More Efficient Learning (1970). A thorough analysis of good and poor underlining examples related specifically to each guideline was done. Individual underlining practice related to each guideline and immediate feedback on the practice were the essential elements of this instructional technique. Materials used for instruction and practice were short in the beginning (i.e. 150-200 words) but increased in length to approximately 1000-1200 words. The content of these materials included textbook type passages in history, science, psychology, and business. Students were given a red pencil to use for underlining during instruction, practice and the experiment.

Group one, which received underlining instruction and practice, and group two, which did not, were asked to read the selection. After the first reading they were to reread each paragraph carefully and underline those parts each student felt were necessary to aid him in understanding the material and in preparing for the comprehension test.

Table 1

Group Reading Scores and Class Composition

Group 1	Group 2	Group 3	Group 4
Instruction + Underlining	Underlining - No instruction	Instructor-Underlining	Non-Cued Passage
Avg. S.S. = 51	Avg. S.S.= 49	Avg. S.S.= 51	Avg. S.S.= 51
Avg. Raw = 31	Avg. Raw = 30	Avg. Raw = 31	Avg. Raw = 31
Total N = 24	Total N = 23	Total N = 15	Total N = 26
10th gr. N = 8 = 33%	10th gr. N = 5 = 22%	10 - 7 = 47%	10 - 6 = 23%
11th gr. N = 11 = 46%	11th gr. N = 11 = 48%	11 - 6 = 40%	11 = 9 = 35%
12th gr. N = 5 = 21%	12th gr. N = 7 - 30%	12 = 2 = 13%	12 = 11 = 42%

S.S. = Standard Score

Comprehension subtest of Gates-MacGinitie, Survey F, Form 1M.

S. S. 50 = MEAN - Gates-MacGinitie

Group three was given the same passage, but with instructor underlined sections, and was told that the underlining had been done to aid in understanding the important information and to prepare for the comprehension test.

Group four was given a non-cued passage and told to read it. They were also told that a comprehension test would follow their reading. There was no time limit imposed. When students finished reading and underlining they signaled the examiner, turned in their reading materials and received a twenty item multiple-choice comprehension test. All students had the same reading passage and questions. The same questions were administered eleven days later to the same treatment groups in order to check delayed recall. Seventy-eight of the original 88 students were treated for delayed recall.

The reading selection was originally adapted from a psychology text by Cronbach (1963) and used by Schnell (1972) in a previous study. Since Schnell's study involved community college freshmen, and this study was conducted with high school students (grades 10-12), the difficulty of the passage was reduced by shortening some sentences and by substituting more common words for technical and more difficult terms (e.g. "motherly" in place of "maternal," and "begins" in place of "emerges"). Thirty-nine changes were made altogether. Attempts to reduce the readability were only partially successful since the passage fell into the college-level range based on the Dale-Chall Readability Formula (1948); on the Smog (1969) into the 12th grade level; and on the Fry (1968) into the 11th grade level. The article was 1043 words in length and dealt with neural maturation, a topic most students would not have prior experience in reading.

Some of the multiple-choice questions were necessarily changed in wording due to changes in the reading selection. The criterion measure was used

previously by Schnell (1972) and a split-half reliability score of .70 resulted.

Results

Data was gathered and analyzed by computer, using the multiple regression analysis technique. Results of the hypotheses tested are described below and listed in Table 2.

TABLE 2 ABOUT HERE

1a. The use of underlining, whether performed by the instructor, or by the student who had previous instruction and practice in underlining, or by the student who had no instruction and practice, resulted in significantly higher (at .001 level) immediate recall scores than the scores of the control group.

1b. The use of underlining, whether performed by the instructor or by the student who had previous instruction and practice in underlining, resulted in higher delayed recall scores than the scores of the control group, but not at the pre-determined .05 level.

2a. The underlining group which did not receive instruction or practice scored significantly higher (at .001 level) on the immediate recall test than the underlining group which did receive prior instruction and practice.

2b. The underlining group which received instruction scored higher (at .10 level) on the delayed recall test than the underlining group which received no instruction.

3. The underlining and instruction group and instructor-underlined group were not significantly different in either immediate or delayed recall.

BEST COPY AVAILABLE

Table 2

Summary of Tested Research Hypotheses Investigating Use and Conditions of Underlining on Reading Comprehension

	Degrees of Freedom Numerator	Degrees of Freedom Denominator	F
1a: Instruction and practice in underlining greater than control	1	86	9.35*
Underlining, no instruction or practice, greater than control	1	86	10.27*
Instructor-underlining greater than control	1	86	11.213*
1b: Instruction and practice in underlining greater than control (delayed recall)	1	86	3.45
Instructor-underlining greater than control (delayed recall)	1	86	3.35
2a: Underlining, no instruction or practice, greater than instruction and practice in underlining	1	86	9.51*
2b: Instruction and practice in underlining greater than underlining no instruction and practice (delayed recall)	1	86	3.29
3a: Instruction and practice in underlining greater than instructor-underlining	1	86	1.84
3b: Instruction and practice in underlining greater than instructor-underlining (delayed recall)	1	86	2.1
4a: Underlining, no instruction and practice greater than instructor-underlining	1	86	3.95*
4b: Underlining, no instruction and practice greater than instructor-underlining (delayed recall)	1	86	.25
5a: Linear interaction between criterion test scores and prior reading ability scores	1	84	2.51
5b: Linear interaction between criterion test scores and prior reading ability scores (delayed recall)	1	84	4.84*

N=88 (Immediate Recall)*$p < .05$ N=78 (Delayed Recall)

4a. The underlining group which did not receive instruction scored significantly higher (at .05 level) than the instructor-underlined group on the immediate recall test.

4b. No significant differences were found between these groups on the delayed comprehension test.

5a. There was no linear interaction between criterion test scores and prior reading ability scores on immediate recall.

5b. There was a significant linear interaction (at .05 level) between criterion test scores and prior reading ability scores on delayed recall. (See Table 2)

Discussion

Based on the data gathered in this experiment, the use of underlining can result in significant improvement in reading comprehension and retention of textbook type materials. An analysis of the various cueing methods used in the study indicated that active participation by the student in underlining is more beneficial than using material underlined by the instructor. An analysis of the cueing methods used to improve long term retention indicated that a more structured or instructor-based method of underlining is more beneficial than a non-structured or non-instructed approach.

A possible interaction between criterion test scores on immediate recall and either prior reading ability or aptitude was suggested by Crouse and Idstein (1972) and Klare, Mabry, and Gustafson (1955). No such relationship existed in this study, indicating that the use of underlining would be beneficial to all high school students like those examined on immediate measures of comprehension, regardless of prior reading ability. However,

there did not exist a significant positive relationship between criterion test scores and prior reading ability on delayed recall, indicating that better readers who use underlining will learn and retain more over a long period of time than poorer readers who use underlining.

Although not treated statistically, observations of types of questions most often answered by the instructor-underlined group indicated that students scored considerably better on cued questions (Avg. 9.6) than on non-cued items (Avg. 7.25) on immediate recall. On delayed recall tests the same score relationships were found (cued Avg. 8.16; non-cued Avg. 6.5).

Another related observation indicated that all group means were considerably higher on literal level items than on interpretive level items on the immediate recall test.

The fact that students scored considerably higher on cued items than on non-cued items on both immediate and delayed recall seems to support Crouse and Idstein's theory (1972) that "when underlining cues direct study time to encoding information required by output which is not otherwise encoded, then output performance will be increased." But it must be remembered that passages in this study were underlined by mutual agreement of two researchers without regard for criterion questions or answers, but based upon an instructional technique. The criterion questions and answers were generated by previous research before the passages were underlined.

Several implications for instruction in content area classes are suggested by these results and observations. Teachers who selectively underline (i.e. up to 20% of material) major ideas for the students in informative type material, or students who underline material directly before some sort of evaluation measure such as a quiz, are likely to improve literal

comprehension. Since literal understanding is probably necessary for students to reach interpretive and applicative levels of understanding, these techniques should be employed directly before group discussion or group activities which require these higher levels of understanding. In order for this technique to affect long term learning it seems that the instructor should initially cue the material for the student while providing specific instruction and practice in underlining.

A few comments should be noted here to help explain these results and to guide future research and instruction. The instruction time allotted group one was not sufficient to indicate the value of this underlining technique. It seems that two or three more hours of instruction and practice would be necessary to ensure maximum improvement in both immediate and delayed recall of prose materials.

It was also felt that the instructional underlining technique advocated in this research was more meaningful and practical than procedures followed in studies where the investigator underlined passages which contained all the correct responses to the criterion questions. Surely the most useful aspect of this study technique lies in instructing students in the independent use of this skill. Students will not always underline directly the answers to all the questions involved in content evaluation.

It was also felt that it was necessary and practical to coordinate the underlining technique used in the instructor-underlined passage and the underlining technique taught during instruction because the first step in underlining instruction should be to provide discrimination practice with instructor-underlined models of effective and non-effective underlining techniques.

Teachers cannot provide models for underlining when the basic criteria is that each underlined section must provide the answer to each of the questions, unless the student has the questions before reading and underlining. The usefulness of this study technique then lies in instructing students in the independent use of this skill based on criteria similar to those followed in this study. By following procedures, techniques and materials which are typical of content area classes, the results and implications of this research are meaningful in terms of planning future use of this technique.

A final suggestion is that future investigations incorporate various review schedules of the material following the initial reading and treatment. This factor is of vital concern to the content area teacher in order to realize the maximum benefit of this technique as a study and retention technique, and to simulate conditions as closely as possible with realistic learning situations.

References

Arnold, Henry F. The comparative effectiveness of certain study techniques in the field of history. Journal of Educational Psychology, 1942, 29, 101-106.

Cashen, V. M. and Leicht, Kenneth L. Role of the isolation effect in a formal educational setting. Journal of Educational Psychology, 1970, 61, 44-46.

Cronbach, L. J. Educational Psychology (2nd ed.). New York: Harcourt, Brace and World, 1963.

Crouse, James H. and Idstein, P. Effects of encoding cues on prose learning. Journal of Educational Psychology, 1972, 63, 309-313.

Dale, E. and Chall, J. A formula for predicting readability. Educational Research Bulletin, 1948, 27, 11-20, 37-54.

Fry, E. A readability formula that saves time. Journal of Reading, 1968, 513-516.

Herber, Harold L., Early, M. J. and Sheldon, W. D. Teaching reading in the secondary schools. Syracuse University, 1967.

Idstein, P. and Jenkins, J. P. Underlining vs. repetitive reading. Journal of Educational Research, 1946, 49, 61-70.

Klare, G. R., Mabry, J. E. and Gustafson, L. M. The relationship of patterning (underlining) to immediate retention and to the acceptability of technical material. Journal of Applied Psychology, 1955, 39, 40-42.

Matthews, C. O. Comparisons of methods of study for immediate and delayed recall. Journal of Educational Psychology, 1938, 29, 101-106.

McLaughlin, G. H. Smog grading - a new readability formula. Journal of Reading, 1969, 12, 626, 646.

Schnell, Thomas R. The effect of organizers on reading comprehension of community college freshmen. Journal of Reading Behavior, 1972-73, 5, 169-176.

Stordahl, Kalmer E. and Christensen, Clifford M. The effect of study techniques on comprehension and retention. Journal of Educational Research, 1956, 49, 61-70.

Wark, David M. and Mogen, M. Read, Underline, Review. New York: McGraw-Hill, 1970.

Willmore, D. J. A comparison of four methods of studying a college textbook. Unpublished doctoral dissertation, University of Minnesota, Minneapolis, 1966.